

**UNITED STATES DISTRICT COURT  
SOUTHERN DISTRICT OF NEW YORK**

JAMES CONTANT, *et al.*,

Plaintiffs,

v.

BANK OF AMERICA  
CORPORATION, *et al.*,

Defendants.

Case No. 17-cv-3139-LGS

(related to No. 13-cv-7789-LGS)

**DECLARATION OF JANET S. NETZ, PH.D.**

May 22, 2020

**DECLARATION OF JANET S. NETZ, PH.D.**

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## I. Qualifications

I, Janet S. Netz, am a founding partner of applEcon, LLC. I have been a tenured Associate Professor of Economics at Purdue University and a Visiting Associate Professor at the University of Michigan. I received a B.A. (1986) from the University of California, Berkeley, cum laude, and an M.A. (1990) and Ph.D. (1992) from the University of Michigan, all in Economics. My doctoral fields of study were Industrial Organization – the study of firm interaction and market performance – and International Trade and Finance. In my thesis I empirically examined the impact of financial instruments (futures contracts) on physical markets.

I have taught Industrial Organization at the undergraduate and doctoral levels; Antitrust and Regulation at the undergraduate level; Microeconomic Theory at the undergraduate and master's levels; and International Economics at the undergraduate and master's levels. My research has focused on competitive interactions of firms and strategies firms can use to increase profits as well as the resulting impact on firms and the market. I have published in peer-reviewed, scholarly journals and have presented my research at many conferences and seminars. I provide my academic employment and publication histories in my curriculum vitae, which is attached as Exhibit A.

I have testified at trial and by affidavit or declaration in matters related to antitrust, consumer protection, and business practices, especially with regard to the impact of anti-competitive conduct, for over fifteen years. In addition, I have consulted on numerous antitrust, consumer protection, and business practices cases. I provide a list of the cases on which I have testified and consulted in my curriculum vitae, which is attached as Exhibit A.

applEcon bills my work on this case at the rate of \$800 per hour. My and applEcon's compensation is not dependent on my opinions or the outcome of the case.

## II. Assignment

I previously submitted a declaration on May 24, 2019, describing a general method of allocating settlement funds in a manner that was proportional to the volume of each Class Member's transactions and the degree to which Class Member transactions were likely impacted by the alleged conspiracy under Plaintiffs' theory of harm.<sup>1</sup>

Counsel has asked me to revise my proposed allocation method to include de minimis payments to all Claimants. The total value of these de minimis payments will be capped at 20% of the settlement fund (net of fees and administration costs). The net settlement funds that remain after these de minimis payments will be allocated to Claimants in proportion to their discounted adjusted trading volume, as described below and in my previous declaration. It is my understanding that counsel expects the de minimis payments to be within the ranges set forth below:

- Claimants who traded spot foreign exchange (FX) between December 1, 2007, and December 31, 2013, will receive a minimum payment of between \$12.50 and \$25.

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<sup>1</sup> 24 May 2019, Declaration of Janet S. Netz, Ph.D. Concerning Proposed Plan of Allocation of Settlement Funds. (Hereinafter "2019 Netz Declaration").

- Claimants who only traded spot FX on or after January 1, 2014, will receive a minimum payment of between \$5 and \$10.

Counsel has also asked me to perform the allocation calculations using data produced by two retail foreign exchange dealers (RFEDs), FXDD and GAIN, for illustrative purposes. These calculations are summarized in Section IV.I and Exhibits 1-4. All documents and data I have relied on are listed in Exhibit B. I reserve the right to revise my conclusions and opinions should more information come to light.

### III. Summary of allegations and the theory of harm and damages

#### A. Allegations

Plaintiffs allege Defendants shared competitively sensitive information and conspired to widen the bid-ask spreads on FX spot transactions in the over-the-counter (OTC) market in violation of various state antitrust and consumer protection laws.<sup>2</sup>

The bid-ask spread is the difference between the price at which a Defendant would buy a currency pair (the bid price) and that price at which it would sell the same currency pair (the ask price). Plaintiffs allege that Defendants' widening of the spreads simultaneously elevated the prices at which Defendants' counterparties purchased spot FX and depressed the prices at which their counterparties sold spot FX.<sup>3</sup>

Defendants' counterparties in the OTC market included RFEDs, which purchased spot FX instruments for resale to retail FX customers including Plaintiffs and members of the Classes.<sup>4</sup>

Plaintiffs further allege that RFEDs set their retail spot FX prices via pricing methods that automatically added a retail markup to the spread paid by the RFED to Defendants. The RFEDs therefore automatically and mechanically passed on the full amount of Defendants' collusive spread increase to their retail customers, including Plaintiffs and members of the Classes, in the form of increased retail bid-ask spreads.

Under Plaintiffs' theory of harm, when a Class Member purchased a currency pair via an RFED during the Class Period, harm suffered is equal to the total purchase price less the total purchase price that would have prevailed but-for Defendants' allegedly collusive conduct.

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<sup>2</sup> 28 November 2018, Second Consolidated Class Action Complaint (hereinafter "Second Complaint"), *Contant et al. v. Bank of America Corporation, et al.*, No. 1:17-cv-03139-LGS (United States District Court for the Southern District of New York, ECF No. 183, at ¶¶ 115-118, 262-280.

<sup>3</sup> All foreign exchange transactions necessarily involve the simultaneous purchase of one currency (the currency received) and the sale of another currency (the currency delivered). By convention, market participants refer to currency pairs in terms of the base currency and the quote currency. For example, the currency pair of the U.S. dollar and the Euro is referred to as the EUR/USD, with the base currency, the Euro, listed first. The exchange rate is denominated in the quote currency, e.g., EUR/USD exchange rates are quoted in terms of the USD. When a bank quotes a bid (ask) price, it is announcing the price at which it will buy (sell) the base currency in terms of the quote currency. For example, the bid price for the EUR/USD is the price in dollars at which the bank will buy Euros and sell U.S. dollars. The ask price for the EUR/USD is the price in dollars at which the bank will sell Euros and buy U.S. dollars. Transactions in both directions (e.g., Euros for U.S. dollars as well as U.S. dollars for Euros) for purchases, i.e., the first half of a "round turn" transaction, are included in the Settlements and will be included for purposes of calculating Claimant transactional volumes for the allocation

<sup>4</sup> Second Complaint, at ¶3.

**B. Assumptions for settlement allocation purposes**

For settlement allocation purposes, I assume Plaintiffs' allegations are true. Specifically, I assume that Defendants' conduct had the effect of widening the spreads of all currency pairs throughout the Class Period and that RFEDs fully passed through those anti-competitive price effects to their retail customers.

Different currency pairs typically trade at different spreads due in large part to differences in liquidity between currency pairs.<sup>5</sup> For example, the USD/JPY (U.S. Dollar/Japanese Yen) currency pair is widely understood to be very liquid and typically has a small spread. From December 2007 through December 2015 the spread for the USD/JPY averaged 0.0210%.<sup>6</sup> The GBP/NZD (British Pound/New Zealand Dollar), on the other hand, is an illiquid currency pair and typically has a larger spread. From December 2007 through December 2015 the spread for the GBP/NZD has averaged 0.0653%, about three times the USD/JPY spread. See Exhibit 5 for a list of spreads for each currency pair.

For settlement allocation purposes, I assume that Defendants' conduct increased spreads by a uniform percentage rate across all currency pairs.<sup>7</sup> This assumption is commonly used when quantifying the impact of anti-competitive conduct, including price-fixing, on the price of goods.<sup>8</sup>

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<sup>5</sup> In my prior declaration, I adopted the currency pair liquidity categories used in the Plan of Distribution in the Direct Purchaser Plaintiff case: most liquid, liquid, illiquid, and pegged. I calculated weighted average spreads for each category and proposed using these average spreads as the basis for allocation calculations. Calculating spreads specific to each currency pair provides a more accurate basis for allocation calculations, and I have changed the calculation method accordingly. See,

- 2019 Netz Declaration.
- 29 September 2017, Plan of Distribution, In re Foreign Exchange Benchmark Rates Antitrust Litigation, No. 1:13-cv-07789-LGS (United States District Court Southern District of New York).

<sup>6</sup> I have expressed the spread as a percentage of the level of the exchange rate. This facilitates the comparison of spreads across all currency pairs, including across FX rates that have different quote currencies. I use this convention throughout my declaration. Bid-ask spreads are commonly expressed as a percentage of the mid-point in basis points (one basis point is 1/100<sup>th</sup> of a percent). See, Lyons, Richard, 2001, *The Microstructure Approach to Exchange Rates*, MIT Press 2001, at Chapter 3, discussing spreads for various exchange rates and comparing them to spreads for stocks, all expressed in basis points.

<sup>7</sup> I also assume that the spread was widened symmetrically, i.e., that the bid price decreased by the same amount that the ask price increased.

<sup>8</sup> See, e.g.,

- The authors describe the “dummy variable” model method of estimating overcharges and note that such an approach often estimates a uniform percentage overcharge. Finkelstein, Michael O. and Levenbach, Hans, 1983, *Regression Estimates of Damages in Price-Fixing Cases*, Law and Contemporary Problems, Vol. 46, No. 4, Statistical Inference in Litigation, 145-169, at pp. 155-156.
- The authors describe the “before-and-after” benchmark method to estimating antitrust overcharges, which implicitly employs calculating a uniform overcharge across products. Oxera and Komninos, Assimakis, December 2009, *Quantifying Antitrust Damages: Towards Non-binding Guidance for Courts*, Study prepared for the European Commission, at pp. 52-59.

Assuming a uniform percentage increase in spreads across all currency pairs, the impact of Defendants' spread widening on a given Class Member trade is proportional to the spread on the currency pair that Class Member traded.

For example, suppose that the Defendants' conduct had the effect of increasing the spread for all currency pairs by 10%, in which case the observed spreads in Exhibit 5 were 10% greater than they would have been in the but-for world. The average spread for the USD/JPY was 0.0210% in the actual world and would have been 0.0191% in the but-for world, a difference of 0.0019 percentage points.<sup>9</sup> The average spread for the GBP/NZD was 0.0653% in the actual world and would have been 0.0594% in the but-for world, a difference of 0.0059 percentage points.<sup>10</sup>

The impact to Class Members who transacted in GBP/NZD would thus be approximately three times greater than the impact to Class Members who transacted in USD/JPY, all else equal.<sup>11</sup> This ratio is in direct proportion to the average spreads for the two currency pairs.<sup>12</sup> Regardless of the size by which the spread was widened by Defendants' conduct, be it 10% or 20%, the impact to Class Members who transacted in GBP/NZD would always be about three times greater than those who transacted in USD/JPY.<sup>13</sup> Using the figures in Exhibit 5, similar calculations can be made to estimate the relative impact of spread widening on Class Members who transacted in all currency pairs.

Fifty-three different currency pairs are represented in the transaction data produced by FXDD and GAIN. I have been able to calculate the average spreads for each of these currency pairs using historical spread data obtained from a market data provider.<sup>14</sup> It is possible that other RFEDs traded other currency pairs with their customers for which market data are not available.<sup>15</sup> In that case I would use the average spread of other illiquid currency pairs in place of the unavailable spread data.

I have not estimated the magnitude of the overcharge and it is not necessary to do so for settlement allocation purposes. Assuming the spreads for all currency pairs increased by the same percentage, all Class Members would have suffered the same proportional impact regardless of the magnitude of the overcharge (that is, regardless of the magnitude by which the

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<sup>9</sup>  $0.0210\% / 1.10 = 0.0191\%$ .

<sup>10</sup>  $0.0653\% / 1.10 = 0.0594\%$ .

<sup>11</sup> Class Members who transacted in GBP/NZD would have paid a spread that was 0.0059 percentage points greater than they would have in the but-for world. Class Members who transacted in USD/JPY would have paid a spread that was 0.0019 percentage points greater than they would have in the but-for world. The degree to which trades in GBP/NZD were damaged relative to trades in USD/JPY is given by  $0.0059/0.0019 = 3.11$ .

<sup>12</sup> The average spreads for GBP/NZD and USD/JPY are 0.0653% and 0.0210%, respectively.  $0.0653\%/0.0210\% = 3.11$ .

<sup>13</sup> For example, if the challenged conduct had instead caused spreads to increase by 20%, the average spreads for the USD/JPY and GBP/NZD would have been 0.0175% and 0.0544% in the but-for world, respectively. The increase in the spread of the GBP/NZD of 0.0109 percentage points would be 3.11 times the increase in the spread of the USD/JPY of 0.0035 percentage points.

<sup>14</sup> Olsen Financial Technologies, 29 April 2020, FX Spot Daily Mean Spread. See Exhibit 6 for a full listing of data series.

<sup>15</sup> Spread data are readily available for the most liquid currency pairs, which, by definition, are popularly traded. However, spread data may be unavailable for less liquid currency pairs, some of which are traded only rarely. Such pairs would almost surely represent a tiny fraction of an RFED's total trading volume.

spread was widened). For example, suppose that a 10% increase in all spreads caused Class Member A to overpay by \$500 and Class Member B to overpay by \$1,000. If the spread instead had increased by 20%, then A would have overpaid by \$1,000 and B by \$2,000. In both cases, B overpaid by twice as much as A and both Class Members' shares of the total overpayment do not depend on the size of the increase in the spread. Because settlement allocation involves allocation of a fixed amount of funds, only Class Members' shares of the total harm are relevant.

### C. Expected impact

Taken together, these assumptions imply that under the Plaintiffs' theory, the impact of Defendants' spread widening on any given trade that a Class Member made would be proportional to the volume of that trade multiplied by the spread at the time of the trade.

For example, suppose a Class Member entered four transactions, buying \$100,000 each of: AUD/NZD, EUR/USD, USD/HKD, and USD/TWD. The impact on that Class Member attributable to each of those trades is summarized in Table 1 below.<sup>16</sup>

Table 1: Overpayment Example					
Trade	Currency pair	Actual spread	Assumed spread increase	But-for spread	Overpayment
\$100,000	AUD/NZD	0.0665%	10%	0.0605%	\$3.02
\$100,000	EUR/USD	0.0145%	10%	0.0132%	\$0.66
\$100,000	USD/HKD	0.0091%	10%	0.0083%	\$0.41
\$100,000	USD/TWD	0.1270%	10%	0.1155%	\$5.77

The wider spread caused the Class Member to overpay by \$5.77 for USD/TWD, which is approximately 1.9 times the \$3.02 overpayment for AUD/NZD. The impact on the Class Member is in direct proportion to the actual spreads for the two currency pairs.<sup>17</sup>

## IV. Settlement allocation calculations

### A. Overview

Counsel has informed me that there are three settlement funds, each of which applies to trades made during a different time period. See Exhibit 7. The total gross settlement fund is \$23,630,000. The net fund available for distribution to Claimants will be lower and will depend on the size of attorneys' fees, expenses, service awards, taxes (if any), and settlement administration costs. For the purposes of this declaration, Counsel has instructed me to assume

<sup>16</sup> The impact attributable to each trade is equal to the price paid in the actual world less the price paid in the but-for world, i.e.,  $\$100,000 \times (\text{actual ask price}) - \$100,000 \times (\text{but-for ask price})$ .

<sup>17</sup>  $0.1270\% / 0.0665\% = 1.9$ .



that these costs and fees will be 30% of the gross settlement fund. That is, the net settlement fund to be allocated to Claimants will be 70% of the gross settlement fund, or \$16,541,000.

Some Claimants may lack detailed trading records,<sup>18</sup> which makes it impossible to estimate the degree to which they were impacted by the challenged conduct. To ensure that such Claimants receive at least some compensation, counsel has proposed that all Claimants will receive one of two de minimis payments:

- Claimants who traded spot FX between December 1, 2007, and December 31, 2013, will receive between \$12.50 and \$25.
- Claimants who only traded spot FX on or after January 1, 2014, will receive between \$5 and \$10.<sup>19</sup>

The de minimis payments will be funded proportionally from the three settlement funds. For example, suppose there is \$16,000,000 of net settlement funds to be allocated to 100,000 Claimants. Suppose further that together the Claimants receive de minimis payments of \$2,000,000, which is 12.5% of the available net settlement funds. Then 12.5% of each settlement fund (net of fees, etc.) would be set aside for the de minimis payments, i.e., \$925,518 from the Citigroup and MUFG Bank fund, \$228,100 from the SocGen and Standard Chartered fund, and \$846,382 from the Group Settling Defendants fund.

After setting aside the funds for the de minimis payments, the remaining portion of each settlement fund would be allocated to individual trades during the appropriate time period in proportion to the volume of the trade multiplied by the spread at the time of the trade.<sup>20</sup> This ensures that the rest of the settlement funds are allocated in proportion to the impact of the challenged conduct on each trade. See Section III.C.

Because each settlement fund applies to a different time period, each fund will be allocated separately. Continuing with the example above, after 12.5% of the net settlement funds were allocated to the de minimis payments:

- \$6,478,629 would remain in the Citigroup and MUFG Bank fund, which would be allocated among all Claimant trades made between December 1, 2007, and July 29, 2019.
- \$1,596,699 would remain in the SocGen and Standard Chartered fund, which would be allocated among all Claimant trades made between December 1, 2007, and the date of the Court's order granting preliminary approval of the SocGen and Standard Chartered Settlements.
- \$5,924,672 would remain in the Group Settling Defendants fund, which would be allocated among all Claimant trades made between December 1, 2007, and December 15, 2015.

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<sup>18</sup> In general, such records are typically held by the Claimant, the RFED, or both. Any Claimant may lack records from either source.

<sup>19</sup> Counsel has also proposed discounting by 90% the value of trades that occurred on or after January 1, 2014. See Section IV.G

<sup>20</sup> Again, the value of trades made on or after January 1, 2014, will be discounted by 90%. See Section IV.G.



The following sections describe the RFED datasets that have been produced so far and the calculations I have performed. It is straightforward to perform these calculations on a dataset that incorporates trading data provided by additional RFEDs or the Claimants themselves.

## **B. Trading data**

Counsel has advised me that the four major RFEDs that operated during the Class Period – Forex Capital Markets (“FXCM”), FXDirectDealer, LLC (“FXDD”), GAIN Capital (“GAIN”), and Oanda Corporation (“Oanda”) – have produced trading data.

In the following subsections, I briefly describe the FXDD and GAIN datasets. Together, the two RFED datasets at hand include 37,127 customers, with approximately \$1.52 trillion traded. The FXCM and Oanda data were only produced recently and have not yet been fully processed. I have, however, determined that the FXCM data contains trading records for approximately 54,000 customers.<sup>21</sup>

### **1. FXDD data**

FXDD produced two files, one with detailed customer information (containing physical addresses, email addresses, phone numbers, etc.) and another with detailed transaction data (currency pairs, trade volumes, trade rates, etc.). The latter file also includes the customer’s name, province (state), and country, which allows matching between the two files.<sup>22</sup>

The FXDD data contain information on approximately 16.7 million individual foreign exchange transactions between FXDD and 10,382 customers in the relevant states. The data also include information on the currency pair, price, volume traded, and date of the transaction. The total trading volume of customers in the relevant states during the Class Period was roughly \$423.5 billion.

### **2. GAIN data**

GAIN produced seven files, one of which includes detailed customer information (containing customer account numbers, names, mailing address, phone numbers, and email addresses) and six of which include customer transactions (containing currency pairs, trade volumes, trade rates, etc.). The customer transactions files also include a customer account number field, which allows them to be matched with the customer information file.<sup>23</sup>

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<sup>21</sup> This figure is preliminary and could change as I and my staff continue to process the FXCM data.

<sup>22</sup> In addition to matching the detailed customer information with the transaction data, I perform a number of cleaning operations to prepare the data for the calculations to follow. The state field in the customer information file often contains inaccurate values or no values at all, which require correction or filling-in using street number, city, and/or zip code information. If an accurate state value cannot be determined, I drop the customer from the analysis. This results in dropping 94 customers. Additional cleaning of the combined data included dropping trades of products not at issue, such as metals and oil, and dropping trades that occurred before December 1, 2007. I also combine customers who maintained the same email address but for whom slight variations in user-entered names create multiple “different” customers. For example, an entry for “John A. Smith” and an entry for “John Smith,” both with the email address of johnsmith@example.com, would be standardized as “John Smith,” allowing me to combine observations for this customer.

<sup>23</sup> In addition to matching the detailed customer information with the transaction data, I perform a number of cleaning operations to prepare the data for the calculations to follow. In the transaction data, I drop observations with a unit price (trade rate) of zero or units (trade volumes) of zero. Cleaning the customer information file first involves scrubbing customer names of unnecessary pieces of text like the word “META” and numbers that come

The GAIN data contain information concerning approximately 26.5 million individual foreign exchange transactions between GAIN and 26,745 customers in the relevant states. The total trading volume of customers in the relevant states during the Class Period was roughly \$1.1 trillion.

### **3. Claimant-provided data**

In addition to these data from RFEDs, Claimants may present their own trading data.

Counsel also expects that some portion of Claimants will be able to prove that they traded spot FX during the relevant time period but lack detailed trading records.

### **C. De minimis allocations**

Counsel has proposed that Claimants who can demonstrate that they traded spot FX between December 1, 2007, and December 31, 2013, will receive a de minimis payment between \$12.50 and \$25. Claimants who can only demonstrate that they traded FX on or after January 1, 2014, will receive a de minimis payment between \$5 and \$10.

The final values of the de minimis payments will be determined, in large part, by the total number of Claimants according to the following:

- The minimum de minimis payments will be \$5 (for Claimants who only traded on or after January 1, 2014) and \$12.50 (for Claimants who traded between December 1, 2007, and December 31, 2013);
- De minimis payment amounts will be set at \$10 and \$25 if that would result in the aggregate de minimis payments totaling less than or equal to 20% of all Claimant awards; and
- If de minimis payments of \$10 and \$25 would result in aggregate de minimis payments of greater than 20% of all Claimant awards, then the de minimis payments will be the greater of the following:
  - \$5 and \$12.50; or
  - Values at which aggregate de minimis payments account for 20% all Claimant awards.

Of the 37,127 Claimants in the FXDD and GAIN datasets, 30,514 traded spot FX between December 1, 2007 and December 31, 2013, and 6,613 traded spot FX only on or after January 1, 2014.

After allocating the de minimis payments, I allocate the remaining settlement funds to the Claimants in proportion to the estimated harm, as described below.

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after the name. I then standardize customer names for customers who had the same account number but for whom slight variations in user-entered names create multiple “different” customers within a distinct account number. For example, an entry for “John A. Smith” and an entry for “John Smith,” both with the account number of 10000001, would be standardized as “John Smith,” allowing me to observe just one customer name for each customer account number found in the transaction data. Additional cleaning includes scrubbing mailing and email addresses of the word “Unknown”.

**D. USD trade volume**

I convert the volume of each transaction into U.S. dollars. For transactions involving a currency pair with a U.S. dollar base, like the USD/JPY, nothing needs to be done as the volume is already expressed in U.S. dollars. For transactions involving a currency pair quoted in U.S. dollars, like the EUR/USD, I use the exchange rate implied by the trade to convert the volume into U.S. dollars. For example, if a customer bought 100,000 EUR/USD at a rate of 1.25, the volume in USD would be  $100,000 \times 1.25 = \$125,000$ .

For transactions that did not involve the U.S. dollar I use the daily exchange rate for the base currency and the U.S. dollar for the conversion.<sup>24</sup> For example, for trades involving the GBP/NZD, I convert the transaction volume from GBP to USD using the daily GBP/USD exchange rate.

**E. Percentage spread**

Next, I calculate the percentage spread for each transaction.

First, I calculate the monthly average spread for each currency pair in the data. For example, the spread on the EUR/USD in June 2010 was \$0.0002175.

Then for each transaction, I divide the average spread for that month by the exchange rate used in the transaction to arrive at the percentage spread. The exchange rate for the EUR/USD in June 2010 averaged \$1.2201 per Euro in the transaction data. Therefore, the percentage spread was 0.0178%.

**F. Adjusted trade volume**

I then calculate the “adjusted trade volume” by multiplying the USD trade volume by the percentage spread.

**G. Time period discount and discounted adjusted trade volume**

Plaintiffs’ counsel has also proposed discounting the value of claims that took place after December 31, 2013 by 90%. Accordingly, for trades that took place on or after January 1, 2014, I multiply the adjusted trade volume by 0.10 to apply a discount rate of 90%.

**H. Total discounted adjusted trade volume**

I then repeat the following steps for each of the three settlement funds for the time period to which the settlement fund applies:

- I sum the discounted adjusted trade volume across all trades for each Claimant during the relevant time period. This results in the Claimant’s total discounted adjusted trade volume.
- I calculate the total discounted adjusted trade volume across all Claimants during the relevant time period.

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<sup>24</sup> For this calculation, I used foreign exchange rate data published by the Federal Reserve Bank. See Exhibit 6.

- I allocate the settlement fund remaining after the de minimis payments. The allocation is in proportion to each Claimant's share of the total discounted adjusted trading volume during the relevant time period.

For example, suppose there was \$6,000,000 remaining in the Group Settling Defendants fund after the de minimis payments were made and there was \$700,000,000 total discounted adjusted trading volume across all Claimants between December 1, 2007 and December 15, 2015. A Claimant with discounted adjusted trade volume of \$7,000 would represent 0.001% of the total adjusted trade volume, so would receive an allocation of 0.001% or \$60 of the \$6,000,000 remaining in the Group Settling Defendants fund.

### **I. Final allocation calculations**

Counsel has asked me to calculate the final allocation for the approximately 37,000 customers in the data provided by FXDD and GAIN.

Counsel has advised me that they expect the total number of Claimants to be in the range of 50,000 to 100,000. Accordingly, I perform the allocation calculations twice; Exhibit 1 presents selected summary statistics for the settlement allocation assuming 50,000 or 100,000 total Claimants.<sup>25</sup>

For example, if there are 100,000 Claimants, the de minimis payments would be \$10 and \$25, and the median Claimant would receive approximately \$37. If, instead, there were 50,000 Claimants, the de minimis payments would remain the same but the median Claimant would receive approximately \$51.

Exhibits 2-4 further illustrate the distribution of the settlement allocation. Each of these exhibits assumes there will be 100,000 Claimants.

Exhibit 2 is a histogram that graphically depicts the distribution of the allocation. Most Claimants would receive less than \$100 in this scenario.

Exhibit 3 lists the allocation amounts for the forty Claimants with the largest payments in the FXDD and GAIN data. For example, the Claimant with the largest payment would receive \$111,980.

Exhibit 4 lists the allocation amounts for forty randomly chosen Claimants from the FXDD and GAIN data. The allocations vary from a low of \$10 to a high of \$30,434, with about half of Claimants receiving between \$10 and \$40.

### **V. Summary**

In this declaration I have described a method to allocate funds from settlements Plaintiffs reached with Defendants. In addition, I have implemented the method for illustrative purposes using the data currently at hand, from FXDD and GAIN.

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<sup>25</sup> I make two other assumptions necessary to calculate the final allocation. I assume that attorneys' and settlement administration fees will account for 30% of the gross settlement fund. I assume that the Claimants as a whole traded spot FX in a pattern (volumes, currency pairs, dates) that is similar to the pattern observed in the FXDD and GAIN customer data.



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### Education

Ph.D. Economics, University of Michigan, 1992  
M.A. Economics, University of Michigan, 1990  
B.A. Economics, University of California at Berkeley, 1986, *cum laude*

### Employment

Founder and Partner, applEcon, May 2001 to present  
Visiting Associate Professor, University of Michigan, Fall 2001, Fall 2002, Fall 2003  
Associate Professor, Purdue University, Fall 2001 to January 2003  
Visiting Assistant Professor, University of Michigan, Winter 2001  
Assistant Professor, Purdue University, Fall 1994 to Spring 2001  
Assistant Professor, University of Delaware, Fall 1992 to Summer 1994

### Courses Taught

Industrial Organization (undergraduate and doctoral)  
Antitrust and Regulation (undergraduate)  
Intermediate Microeconomics (undergraduate and master's)  
Microeconomic Principles (undergraduate)  
International Economics (undergraduate and master's)

### Honors and Awards

Outstanding Antitrust Litigation Achievement in Economics, awarded by the American Antitrust Institute, for work in re TFT-LCD Antitrust Litigation, 2013.

Outstanding Economics Professor of the Year, Economics Club, Purdue University, 1999.

## **Publications**

"Are All Men's College Basketball Players Exploited?", with Erin Lane and Juan Nagel, *Journal of Sports Economics*, 15(3), June 2014, 237-262.

"Price Regulation: Theory and Performance", in *Regulation and Economics*, Roger J. Van den Bergh and Alessio M. Paccas, eds., Edward Elgar Publishing, 2011.

"Sports Trivia: A Review of The Economics of Intercollegiate Sports by Randy R. Grant, John Leadley, and Zenon Zygmunt", *Journal of Economic Literature*, 47(2), June 2009, 485-489.

"One-Way Standards as an Anti-Competitive Strategy", with Jeffrey K. MacKie-Mason, in *Standards and Public Policy*, Shane Greenstein and Victor Stango, eds., Cambridge Press, 2007.

"International Integration and Growth: A Further Investigation on Developing Countries", with Claire Economidou and Vivian Lei, *International Advances in Economic Research*, 12(4), November 2006, 435-448.

"Maximum or Minimum Differentiation? An Empirical Investigation into the Location of Firms", with Beck A. Taylor, *Review of Economics and Statistics*, 84(1), February 2002, 162-175.

"International Integration and Growth: A Survey and Empirical Investigation", with Vivian Lei and Jon D. Haveman, *Review of Development Economics*, 5(2), June 2001, 289-311.

"Price Regulation: A (Non-Technical) Overview", in *Encyclopedia of Law and Economics*, Boudewijn Bouckaert and Gerrit De Geest, eds, Edward Elgar and University of Ghent, 2000.

"Exercising Market Power in Proprietary Aftermarkets," with Severin Borenstein and Jeffrey K. MacKie-Mason, *Journal of Economic and Management Strategy*, 9(2), Summer 2000, 157-188.

"All in the Family: Family, Income, and Labor Force Attachment", with Jon D. Haveman, *Feminist Economics*, 5(3), November 1999, 85-106.

"Why Do All Flights Leave at 8am?: Competition and Departure-Time Differentiation in Airline Markets", with Severin Borenstein, *International Journal of Industrial Organization*, 17(5), July 1999, 611-640.

"An Empirical Test of the Effect of Basis Risk on Cash Market Positions", *Journal of Futures Markets*, 16(3), May 1996, 289-312.

"The Effect of Futures Markets and Corners on Storage and Spot Price Variability", *American Journal of Agricultural Economics*, 77(1), February 1995, 182-193.

"Antitrust Policy in Aftermarkets", with Severin Borenstein and Jeffrey K. MacKie-Mason, *Antitrust Law Journal*, 63(2), Winter 1995, 455-482.

"The Economics of Customer Lock-In and Market Power in Services", with Severin Borenstein and Jeffrey K. MacKie-Mason, in *The Service Productivity and Quality Challenge*, Patrick T. Harker, ed., Kluwer Academic, 1994.

## **Working Papers and Work in Progress**

"LCDs and Antitrust: Does Crime Pay?", with Nick Navitski and Josh Palmer

"Fantasy Football Points as a Measure of Performance", with Erin Lane and Juan Nagel

"Non-Profits and Price-Fixing: The Case of the Ivy League"

"The End of Collusion? Competition after Justice and the Ivy League and MIT Settle"

"Basis and Exchange Rate Risks and their Impact on Storage and Exports"

### **Research Grants**

"Product Customization and Product-Space Positioning", Dauch Center for the Management of Manufacturing Enterprises, Summer 2000.

"Trade Barriers, Trade Blocs, Growth, and Convergence", Purdue Research Foundation, 1998-1999.  
"Effects of Informational Asymmetry on Competition in the Residential Long Distance Calling Market", Purdue Research Foundation, 1997-1998.

"Basis and Exchange Rate Risks and their Impact on Storage and Exports", Center for International Business and Economic Research, Summer 1997.

Global Initiative Faculty Grant (Course Development), "Industrial Organization in an International Marketplace", Purdue University, Summer 1997.

"Trade, Not Aid", Purdue Research Foundation, Summer 1996.

"Trade, Not Aid", Center for International Business and Economic Research, Summer 1996.

"The Effect of Price-Fixing by Institutions of Higher Education", Purdue Research Foundation, Summer 1995.

"Applied Microeconomics/International Workshop", Purdue University, Spring 1995.

"The Market Structure of Higher Education", University of Delaware, Summer 1993.

Research Associate, Center for the Study of Futures Markets, Columbia University, 1991.

Rackham Merit Fellowship, University of Michigan, 1987-1989.

Chancellor's Scholar, University of California at Berkeley, 1983-1986.

### **Referee**

American Economic Review  
Contemporary Economic Policy  
Economics Bulletin  
Feminist Economics  
International Journal of the Economics of Business  
International Journal of Industrial Organization  
Journal of Economic Education  
Journal of Economic and Management Strategy  
Journal of Family and Economic Issues  
Journal of Futures Markets  
Journal of Industrial Economics  
Journal of Law and Economics  
Journal of Law, Economics, and Organization  
Management Science  
Review of Economics and Statistics  
Scandinavian Journal of Economics  
Telecommunications Systems



### Conference and Workshop Presentations

Panel participant, “*Apple v. Pepper*: SCOTUS Clarifies Application of *Illinois Brick*”, ABA Section of Antitrust Law, May 2019.

Panel participant, “Is ‘Direct’ Really Correct? Bricks, Tix, Kicks, and Apps after *Apple v. Pepper*”, ABA Section of Antitrust Law, Pricing Conduct and Civil Practice and Procedure Committees Program, October 2018.

Panel participant, “Will Apple’s App Store Lead to the end of *Illinois Brick*”, CLA Antitrust, UCL & Privacy Law Section and ABA Antitrust Section’s Global Private Litigation Committee program, San Francisco, CA, July 2018.

Guest lecturer, Antitrust Law, University of San Francisco Law School, April 2017 and 2018.

Panel participant, “The Challenge of Circumstantial Proof of Cartel Behavior and of Presenting Economic Issues and Concepts to Judges and Juries”, American Antitrust Institute, 10<sup>th</sup> Annual Private Enforcement Conference, Washington, DC, November 2016.

Panel participant, “Winning or Losing: Class Certification Post-Comcast”, American Bar Association, 62<sup>nd</sup> Antitrust Law Spring Meeting, Washington, DC, March 2014.

Panel participant, “Preparing Early and Often”, State-of-the-Art Strategies for Managing Class Action Experts, American Bar Association, 16<sup>th</sup> Annual National Institute on Class Actions, Chicago, IL, October 2012.

Panel participant, “Hot Topics Involving Experts in Antitrust Litigation”, New York State Bar Association, Antitrust Law Section, Annual Meeting, New York, NY, January 2011.

Guest lecturer, Alternative Dispute Resolution Practicum, University of Michigan Law School, April 2008.

“The Economics of Indirect Purchaser Cases”, State Bar of Arizona Annual Conference, Phoenix, AZ, June 2004.

“Manipulating Interface Standards as an Anti-Competitive Strategy”, Standards and Public Policy Conference, Federal Reserve Bank of Chicago, Chicago, IL, May 2004.

“One-Way Standards as an Anti-Competitive Strategy”, Telecommunications Policy Research Conference, Alexandria, VA, September 2002.

“Product Proliferation and Product Space Location”, Econometric Society Meetings, New Orleans, January 2001.

“The End of Collusion? Competition after Justice and the Ivy League and MIT Settle”, American Economics Association Meetings, New Orleans, January 2001.

“The End of Collusion? Competition after Justice and the Ivy League and MIT Settle”, Indiana University-Purdue University Indianapolis, November 2000.

“Maximum or Minimum Differentiation? An Empirical Investigation into the Location of Firms”, University of British Columbia, March 2000.

“Non-Profits and Price-Fixing: The Case of the Ivy League”, University of Illinois, October 1999.

“The End of Collusion? Competition after Justice and the Ivy League and MIT Settle”, Baylor University, September 1999.

"The End of Collusion? Competition after Justice and the Ivy League and MIT Settle", Western Economic Association Meetings, San Diego, July 1999.

"Non-Profits and Price-Fixing: The Case of the Ivy League", University of Chicago, April 1999.

"Non-Profits and Price-Fixing: The Case of the Ivy League", Indiana University, December 1998.

"International Integration and Growth: A Survey and Empirical Investigation", Dynamics, Economic Growth, and International Trade, III, Taiwan, August 1998.

Discussant ("Fiscal Policy and International Demand Spillovers"), Dynamics, Economic Growth, and International Trade, III, An International Conference, Taiwan, August 1998.

"International Integration and Growth", Workshop on Empirical Research in International Trade and Investment, Copenhagen, June 1998.

Discussant ("Factor Endowments and the Pattern of Affiliate Production by Multinational Enterprises," by Karolina Ekholm), Workshop on Empirical Research in International Trade and Investment, Copenhagen, June 1998.

"Non-Profits and Price-Fixing: The Case of the Ivy League", Department of Justice Antitrust Division, April 1998.

"Non-Profits and Price-Fixing: The Case of the Ivy League", American Economics Association Meetings, Chicago, January 1998.

Discussant ("Equilibrium under Satisficing," by Ralph W. Pfouts), International Atlantic Economics Society, ASSA Meetings, Chicago, January 1998.

Discussant ("Overseas Investments and Firm Exports," by Keith Head and John Ries), Fourth Annual Empirical Investigations in International Trade conference, Purdue University, November 1997.

"Maximum or Minimum Differentiation? An Empirical Investigation into the Location of Firms", International Atlantic Economic Association Conference, Philadelphia, October 1997.

Discussant ("Antidumping Enforcement in a Reciprocal Model of Dumping: Theory and Evidence," Taiji Furusawa and Thomas J. Prusa) and session chair, Third Annual Empirical Investigations in International Trade conference, Purdue University, November 1996.

"The Effect of Price-Fixing by Institutions of Higher Education", Indiana University-Purdue University Indianapolis, April 1996.

"Exercising Market Power in Proprietary Aftermarkets", with Severin Borenstein and Jeffrey K. MacKie-Mason, Indiana University - Purdue University - IUPUI First Tri-School Conference, March 1996.

"All in the Family: Family, Income, and Labor Force Attachment", with Jon D. Haveman, American Economic Association Meetings, San Francisco, January 1996.

"Family Matters: Unemployment, Wage Changes, and Mobility", with Jon D. Haveman, Southern Economics Association Meetings, New Orleans, November 1995.

Discussant and session chair, Second Annual Empirical Investigations in International Trade conference, Purdue University, November 1995.

“Competition and Anti-Competitive Behavior”, ICLE (The State Bar of Michigan) Conference on Antitrust and Intellectual Property, July 1995.

“Price-Fixing, Tuition, and Financial Aid”, Midwest Economics Association Meetings, Cincinnati, April 1995.

“Family Matters: Unemployment, Wage Changes, and Mobility,” Midwest Economics Association Meetings, Cincinnati, April 1995.

Discussant and session chair, “Customer Discrimination, Entrepreneurial Decisions, and Investment”, Midwest Economics Association Meetings, April 1995.

“An Empirical Test of the Effect of Basis Risk on Cash Market Positions”, University of Illinois, Urbana-Champaign, February 1995.

Discussant and session chair, First Annual Empirical Investigations in International Trade conference, Purdue University, November 1994.

“Antitrust Policy in Aftermarkets”, with Severin Borenstein and Jeffrey K. MacKie-Mason, FTC/DOJ/ABA Conference on Post-Chicago Economics, Washington, D.C., May 1994.

“The Effect of Price-Fixing by Institutions of Higher Education, University of Delaware, May 1994.

“The Effect of Futures Markets and Corners on Storage and Spot Price Variability”, Purdue University, February 1994.

“An Empirical Test of the Effect of Basis Risk on Cash Market Positions”, University of California at Davis, February 1993.

Discussant, Econometrics Association, Anaheim, 1992 Annual Meetings.

“Testing the Principle of Minimum Differentiation: Airline Departure-Time Crowding”, Econometrics Association, Washington, D.C., 1990 Annual Meetings.

### **Consulting and Testifying**

Contant v. Bank of America, 2019-  
*United States District Court, Southern District of New York*, No. 17-cv-3139-LGS  
Testifying expert for plaintiffs

Confidential client, 2019-  
Antitrust analysis regarding various cellular phone components

In re Malden Transportation, Inc. et al., v. Uber Technologies, Inc., 2018-  
*United States District Court, District of Massachusetts*, No. 1:16-cv-12538-NGM  
Testifying expert for plaintiffs

Confidential client, 2017-2018  
Antitrust analysis regarding various cellular phone components

In re Automotive Parts Antitrust Litigation

*United States District Court, Eastern District of Michigan Southern Division*, No. 2:12-cv-02311

Testifying expert for plaintiffs

- In re Occupant Safety Systems, No. 2:12-cv-00603, 2018-
- In re Heater Control Panels, No. 2:12-cv-00403, 2018-
- In re Anti-Vibrational Rubber Parts, No. 2:13-cv-00803-MOB-MKM, 2016-
- In re Bearings, No. 2:12-cv-00500, 2016-
- In re Automotive Wire Harness Systems Antitrust Litigation, No. 12-md-00101, 2012-
- In re Shock Absorbers Cases, No. 2:16-cv-0332, 2015-

Alarm Detection Systems, Inc. v. Orland Fire Protection District, et al., 2016-

*United States District Court, Northern District of Illinois*, No. 14-cv-00876

Testifying expert for plaintiff

Deposed May 2017

Testified at trial May 2017

In re LIBOR-Based Financial Instruments Antitrust Litigation, 2016-

*United States District Court, Southern District of New York*, No. 1:11-md-02262-NRB

Testifying expert for plaintiffs

Deposed March 2017, June 2017

Stacey Pierce-Nunes, on behalf of herself and all others similarly situated, v. Toshiba American Information Systems, 2015-

*United States District Court, Central District of California*, No. 3:14-CV-00796 JST

Testifying expert for plaintiffs

Deposed April 2016

John Moseley v. Toshiba America Information Systems, Inc., 2015-

Judicial Arbitration and Mediation Services No. 1200049482

Testifying expert for claimant

Deposed July 2015

In re Cathode Ray Tube (CRT) Antitrust Litigation, 2008-

*United States District Court, Northern District of California, San Francisco Division*, No. CV-07-5944-SC

Testifying expert for plaintiffs

Deposed November 2012, March 2013, June 2014, September 2014, October 2014

In re Photochromic Lens Antitrust Litigation, 2010-2012

*United States District Court Middle District of Florida, Tampa Division*, No. 8:10-md-02173-JDW-EAJ

Testifying expert for plaintiffs

Deposed August 2012

Datel Holdings and Datel Design and Development v. Microsoft, 2010-2011

*United States District Court, Northern District of California, San Francisco Division*, No. 09-cv-05535

Testifying expert for plaintiffs

Deposed October 2011

In re Prefilled Propane Tank Marketing and Sales Practices Litigation, 2010-2011

*United States District Court, Western District of Missouri, Western Division*, No. 4:09-cv-00465

Testifying expert for plaintiffs

In re Florida Cement and Concrete Antitrust Litigation, 2010

*United States District Court, Southern District of Florida, Miami Division*, No. 1:09-cv-23493-CMA

Consulting expert for plaintiffs

Altair Engineering v. MSC Software, 2009-2010

*United States District Court, Eastern District of Michigan, Southern Division*, No. 2:07-cv-12807

Testifying expert for plaintiff

Deposed May 2010

In re Optical Disk Drive products Antitrust Litigation, 2009-2010

*United States District Court, Northern District of California, San Francisco Division*, No. M:2010-cv-02143

Consulting expert for plaintiffs

In re Flash Memory Antitrust Litigation, 2008-2011

*United States District Court, Northern District of California, Oakland Division*, No. C-07-0086-SBA

Testifying expert for plaintiffs

Deposed August 2009

Valassis Communications, Inc. v. News America, Inc., 2008-2009

*United States District Court, Eastern District of Michigan, Southern Division*, No. 2:06-cv-10240

*Circuit Court of the State of Michigan, County of Wayne*, No. 07-0706645-CZ

Consulting expert for plaintiff

In re TFT-LCD (Flat Panel) Antitrust Litigation, 2008-present

*United States District Court, Northern District of California, San Francisco Division*, No. M:07-cv-01827

Testifying expert for plaintiffs

Deposed July 2009, June 2011, August 2011

Houston Baptist University v. NCAA, 2008-2009

*United States District Court in and for the Southern District of Texas, Houston Division*

Testifying expert for plaintiff

Seoul Semiconductor Co. v. Nichia Corp., 2008

*United States District Court, Northern District of California*, No. 3:08-cv-04932-PJH

Testifying expert for plaintiffs

Albert Andy Cohn v. Office Depot, 2008

*Superior Court of the State of California, County of Los Angeles, Central District*, No. BC 372449

Testifying expert for defendant

In re Graphics Processing Units Antitrust Litigation, 2007-2008

*United States District Court Northern District of California*, No. M:07-CV-01826-WHA

Testifying expert for plaintiffs

Deposed June 2008

Pro-Sys Consultants Ltd. and Neil Godfrey v. Microsoft, 2007-present

*Supreme Court of British Columbia*, No. L043175, *Vancouver Registry*

Testifying expert for plaintiffs

Deposed December 2008

In re Dynamic Random Access Memory (DRAM) Antitrust Litigation, 2007

*United States District Court, Northern District of California*, No. 02-cv-01486

Consulting expert for plaintiffs

Jason White et al. v. NCAA, 2006-2008

*United States District Court Central District of California*, No. CV 06-0999 RGK (MANx)

Testifying expert for plaintiffs

Deposed October 2007

In re Reformulated Gasoline (RFG) Antitrust and Patent Litigation, 2004-2008  
*United States District Court Central District of California*, No. 05-1671 CAS  
Testifying expert for plaintiffs  
Deposed December 2006

Carlisle, settlement negotiations with Crompton, EPDM price-fixing cartel, 2005-2007  
Consulting expert

Caterpillar and Carlisle, settlement negotiations with DuPont-Dow Elastomers, PCP (or CR) and EPDM price-fixing cartels, 2004-2005  
Consulting expert

City and County of San Francisco et al. v. Microsoft, 2004-2007  
*United States District Court for the District of Maryland*, No. 1332  
Testifying expert for plaintiffs

The Service Source v. Office Depot, 2004-2005  
*United States District Court Eastern District of Michigan Southern Division*, No. 02-73361  
Project director

Joe Comes et al. v. Microsoft, 2002-2008  
*Iowa District Court for Polk County*, No. CL82311  
Testifying expert for plaintiffs  
Deposed July 2006, November 2006

Charles Cox et al. v. Microsoft, 2002-2006  
*Supreme Court of the State of New York County of New York*, No. 105193/00  
Testifying expert for plaintiffs

Daniel Gordon et al. v. Microsoft, 2002-2004  
*State of Minnesota District Court County of Hennepin Fourth Judicial District*, No. 00-5994  
Testifying expert for plaintiffs  
Deposed September 2003

Morelock Enterprises, Inc. v. Weyerhaeuser Co., 2004-2008  
*United States District Court District of Oregon*, No. 3:04-cv-00583-PA  
Testifying expert for plaintiffs  
Deposed October 2004, April 2005, October 2007  
Testified in trial April 2008

Compuware v. IBM, 2002-2005  
*United States District Court for the Eastern District of Michigan*, No. 02-70906  
Project director

In re New Mexico Indirect Purchaser Microsoft Corp. Antitrust Litigation, 2002-2004  
*State of New Mexico First Judicial District*, No. D-0101-CV-2000-1697  
Testifying expert for plaintiffs

Charles Friedman et al. v. Microsoft, 2002-2004  
*Superior Court of the State of Arizona in and for the County of Maricopa*, No. CV2000-000722 / CV2000-005872  
Testifying expert for plaintiffs  
Deposed September 2003

In re Massachusetts Consumer Protection Litigation, 2003-2004  
*Commonwealth of Massachusetts, Superior Court Department of the Trial Court Middlesex Division*,  
No. 00-2456  
Consulting expert

Olson v. Microsoft, 2002  
*Montana First Judicial District Court Lewis & Clark County*, No. CDV-2000-219  
Consulting expert

Covad v. Bell Atlantic (Verizon), 2001-2004  
*United District Court for the District of Columbia*, No. 99-1046  
Project director

AMD, 2000-2004  
Project director

Leckrone, et al. v. Premark International, Inc., et al., 2001  
Testifying expert for plaintiffs

Ren, et al. v. EMI Music Distribution, Inc., 2001  
*State of Michigan in the Circuit Court of the County of Macomb*, No. 00-2383-CZ  
Testifying expert for plaintiffs

SBC, 2000  
Staff economist

Lingo et al. v. Microsoft, 1999-2004  
*Superior Court of the State of California City and County of San Francisco*, J.C.C.P. No. 4106  
Project director

Gravity et al. v. Microsoft, 1999-2003  
*United States District Court for the District of Columbia*, No. 1:99CV00363  
Staff economist

City and County of San Francisco, 1999  
Staff economist

Intergraph v. Intel, 1998-2001  
*United States District Court Appeals for the Federal District*, No. 98-1308  
Staff economist

Comm-Tract v. Northern Telecom, 1991-1997  
*United States District Court District of Massachusetts*, No. 90-13088-WF  
Project director

Systemcare, Inc. v. Wang Computer, 1991-1993  
*United States District Court for the District of Colorado*, No. 89-B-1778  
Staff economist

International Travel Arrangers v. Northwest Airlines, 1988-1989  
Staff economist



## **Exhibit B: Documents Considered in the Declaration of Janet S. Netz, Ph.D.**

24 May 2019, Declaration of Janet S. Netz, Ph.D. Concerning Proposed Plan of Allocation of Settlement Funds.

28 November 2018, Second Consolidated Class Action Complaint, Contant et al. v. Bank of America Corporation, et al., No. 1:17-cv-03139-LGS (United States District Court for the Southern District of New York).

29 September 2017, Plan of Distribution, In re Foreign Exchange Benchmark Rates Antitrust Litigation, No. 1:13-cv-07789-LGS (United States District Court Southern District of New York).

Bank of Russia, Undated, Dynamics of the official exchange rates, [https://www.cbr.ru/eng/currency\\_base/dynamics/?UniDbQuery.Posted=True&UniDbQuery.mode=1&UniDbQuery.date\\_req1=&UniDbQuery.date\\_req2=&UniDbQuery.VAL\\_NM\\_RQ=R01235&UniDbQuery.From=01%2F01%2F1998&UniDbQuery.To=30%2F04%2F2020](https://www.cbr.ru/eng/currency_base/dynamics/?UniDbQuery.Posted=True&UniDbQuery.mode=1&UniDbQuery.date_req1=&UniDbQuery.date_req2=&UniDbQuery.VAL_NM_RQ=R01235&UniDbQuery.From=01%2F01%2F1998&UniDbQuery.To=30%2F04%2F2020), accessed 29 April 2020.

Board of Governors of the Federal Reserve System (US), Undated, FRED Add-In for Microsoft Excel, <https://fred.stlouisfed.org/fred-addin/>, accessed 24 April 2019.

Central Bank of the Republic of Turkey, Undated, Exchange Rates (Daily) - (USD) US Dollar (Buying) - Level, [https://evds2.tcmb.gov.tr/index.php?/evds/serieMarket/collapse\\_2/5863/DataGroup/english/bie\\_dkdovyt/](https://evds2.tcmb.gov.tr/index.php?/evds/serieMarket/collapse_2/5863/DataGroup/english/bie_dkdovyt/), accessed 05 March 2020.

Czech National Bank, Undated, Exchange rates - yearly history: 2000 (CZK), <https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2000>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2001 (CZK), <https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2001>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2002 (CZK), <https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2002>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2003 (CZK), <https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2003>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2004 (CZK), <https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2004>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2005 (CZK), <https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2005>, accessed 09 July 2019.

## **Exhibit B: Documents Considered in the Declaration of Janet S. Netz, Ph.D.**

Czech National Bank, Undated, Exchange rates - yearly history: 2006 (CZK),  
<https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2006>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2007 (CZK),  
<https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2007>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2008 (CZK),  
<https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2008>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2009 (CZK),  
<https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2009>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2010 (CZK),  
<https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2010>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2011 (CZK),  
<https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2011>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2012 (CZK),  
<https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2012>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2013 (CZK),  
<https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2013>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2014 (CZK),  
<https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2014>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2015 (CZK),  
<https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2015>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2016 (CZK),  
<https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2016>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2017 (CZK),  
<https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2017>, accessed 09 July 2019.

Czech National Bank, Undated, Exchange rates - yearly history: 2018 (CZK),  
<https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2018>, accessed 09 July 2019.

## **Exhibit B: Documents Considered in the Declaration of Janet S. Netz, Ph.D.**

Czech National Bank, Undated, Exchange rates - yearly history: 2019 (CZK), <https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2019>, accessed 09 July 2019.

Finkelstein, Michael O., Levenbach, Hans, 1983, Regression Estimates of Damages in Price-Fixing Cases, Law and Contemporary Problems, Vol. 46, No. 4, Statistical Inference in Litigation, 145-169.

FXDD Customer Information

FXDD Customer Transactions

GAIN Customer Information

GAIN Customer Transactions

GAIN Capital Holdings, Inc., 11 March 2020, GAIN 20070101-20101231 Customer Transactions.

Hungarian National Bank, Undated, Official daily exchange rates, <https://www.mnb.hu/Root/ExchangeRate/arfolyam.xlsx>, accessed 09 July 2019.

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National Bank of Poland, Undated, Average exchange rates table in 2007, [https://www.nbp.pl/kursy/archiwum/archiwum\\_tab\\_a\\_2007.xls](https://www.nbp.pl/kursy/archiwum/archiwum_tab_a_2007.xls), accessed 09 July 2019.

National Bank of Poland, Undated, Average exchange rates table in 2008, [https://www.nbp.pl/kursy/archiwum/archiwum\\_tab\\_a\\_2008.xls](https://www.nbp.pl/kursy/archiwum/archiwum_tab_a_2008.xls), accessed 09 July 2019.

National Bank of Poland, Undated, Average exchange rates table in 2009, [https://www.nbp.pl/kursy/archiwum/archiwum\\_tab\\_a\\_2009.xls](https://www.nbp.pl/kursy/archiwum/archiwum_tab_a_2009.xls), accessed 09 July 2019.

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## **Exhibit B: Documents Considered in the Declaration of Janet S. Netz, Ph.D.**

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[https://www.nbp.pl/kursy/archiwum/archiwum\\_tab\\_a\\_2011.xls](https://www.nbp.pl/kursy/archiwum/archiwum_tab_a_2011.xls), accessed 09 July 2019.

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National Bank of Poland, Undated, Average exchange rates table in 2014,  
[https://www.nbp.pl/kursy/archiwum/archiwum\\_tab\\_a\\_2014.xls](https://www.nbp.pl/kursy/archiwum/archiwum_tab_a_2014.xls), accessed 09 July 2019.

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[https://www.nbp.pl/kursy/archiwum/archiwum\\_tab\\_a\\_2016.xls](https://www.nbp.pl/kursy/archiwum/archiwum_tab_a_2016.xls), accessed 09 July 2019.

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Olsen Financial Technologies, 29 April 2020, FX Spot AUD\_CAD Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot AUD\_CHF Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot AUD\_JPY Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot AUD\_NZD Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot AUD\_USD Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot CAD\_CHF Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot CAD\_JPY Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot CHF\_JPY Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot EUR\_AUD Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot EUR\_CAD Daily Mean Spread 200712-201512.

**Exhibit B: Documents Considered in the Declaration of Janet S. Netz, Ph.D.**

Olsen Financial Technologies, 29 April 2020, FX Spot EUR\_CHF Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot EUR\_CSK Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot EUR\_DKK Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot EUR\_GBP Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot EUR\_HUF Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot EUR\_JPY Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot EUR\_NOK Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot EUR\_NZD Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot EUR\_PLN Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot EUR\_SEK Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot EUR\_TRY Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot EUR\_USD Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot GBP\_AUD Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot GBP\_CAD Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot GBP\_CHF Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot GBP\_JPY Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot GBP\_NZD Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot GBP\_USD Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot NZD\_CAD Daily Mean Spread 200712-201512.

**Exhibit B: Documents Considered in the Declaration of Janet S. Netz, Ph.D.**

Olsen Financial Technologies, 29 April 2020, FX Spot NZD\_CHF Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot NZD\_JPY Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot NZD\_USD Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot SGD\_JPY Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_CAD Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_CHF Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_CNH Daily Mean Spread 201104-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_CNY Daily Mean Spread 200712-201412.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_CSK Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_DKK Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_HKD Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_HUF Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_INR Daily Mean Spread 200712-201412.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_JPY Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_MXP Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_NOK Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_PLN Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_RUB Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_SEK Daily Mean Spread 200712-201512.

**Exhibit B: Documents Considered in the Declaration of Janet S. Netz, Ph.D.**

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_SGD Daily Mean Spread 200712-201512.

Olsen Financial Technologies, 29 April 2020, FX Spot USD\_TRY Daily Mean Spread 200712-201512.

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U.S. Census Bureau, 13 March 2013, 2010 State FIPS Codes, <http://www2.census.gov/geo/docs/reference/state.txt>, accessed 05 December 2019.



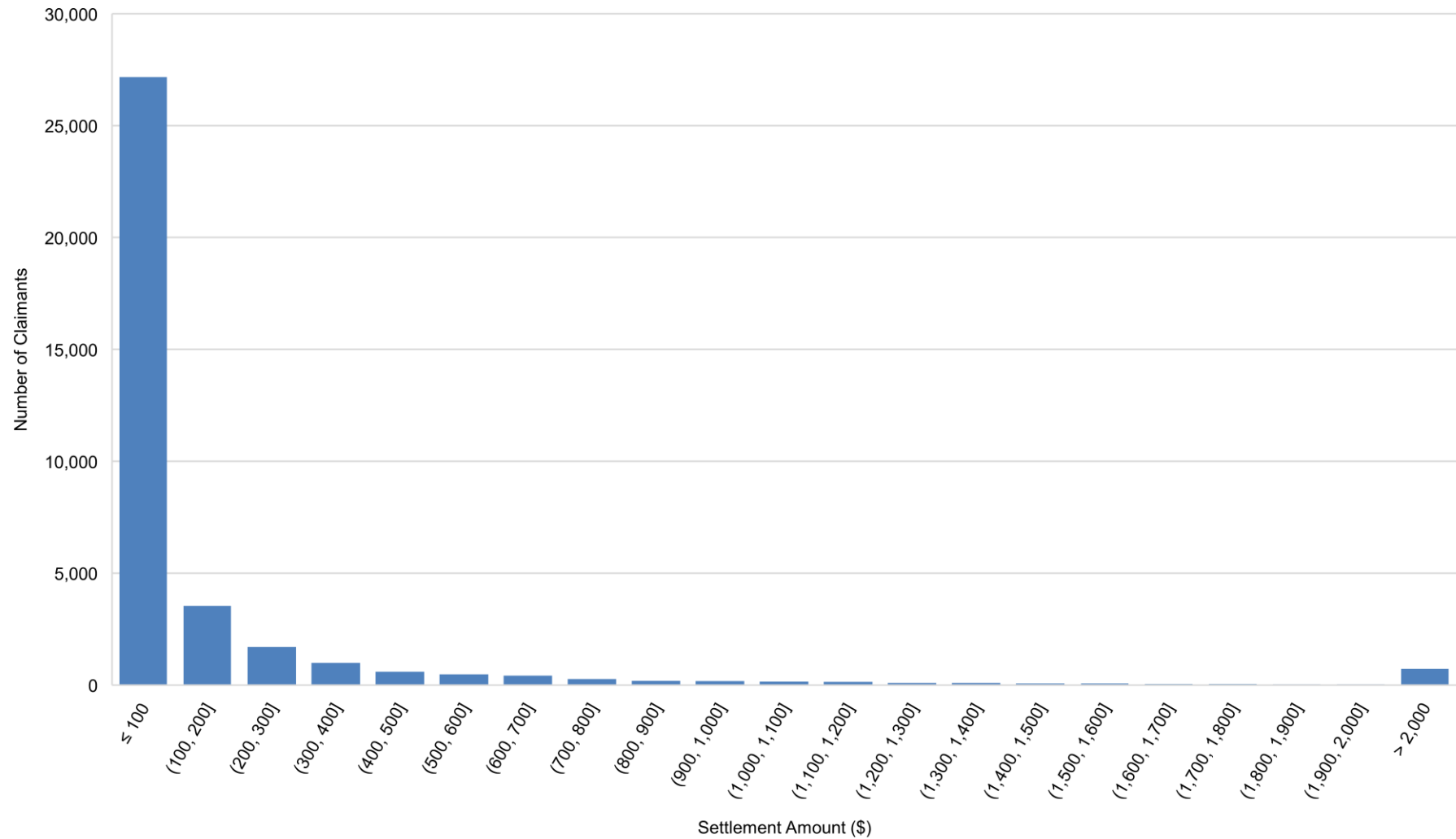
**Settlement Amount Summary Statistics**

	<b>50,000 Claimants</b>	<b>100,000 Claimants</b>
Minimum	\$ 10	\$ 10
10th Percentile	\$ 11	\$ 11
25th Percentile	\$ 27	\$ 26
Median	\$ 51	\$ 37
75th Percentile	\$ 164	\$ 89
90th Percentile	\$ 556	\$ 271
Maximum	\$ 241,405	\$ 111,980
 Total De Minimis	 \$ 1,116,411	 \$ 2,232,822
 Net Settlement	 \$ 16,541,000	 \$ 16,541,000
 De Minimis Share of Net Settlement	 6.75%	 13.50%

Data Source(s): FXDD, GAIN, Olsen Daily Mean Spread, Zip Code, and U.S. Federal Reserve Exchange Rate Data (see Exhibit 6)

Source File(s): FXDD and GAIN combined.do; FXDD and GAIN combined.xlsx

### Illustrative Allocation of Funds to FXDD and GAIN Claimants



Data Source(s): FXDD, GAIN, Olsen Daily Mean Spread, Zip Code, and U.S. Federal Reserve Exchange Rate Data (see Exhibit 6)

Source File(s): FXDD and GAIN combined.do; FXDD and GAIN combined.xlsx

## Allocation for Top 40 Claimants in FXDD and GAIN Data

<b>Alias</b>	<b>Settlement Amount</b>
Class Member 1	\$ 111,980
Class Member 2	\$ 65,782
Class Member 3	\$ 38,109
Class Member 4	\$ 30,434
Class Member 5	\$ 29,397
Class Member 6	\$ 29,317
Class Member 7	\$ 27,965
Class Member 8	\$ 27,667
Class Member 9	\$ 25,579
Class Member 10	\$ 23,243
Class Member 11	\$ 21,943
Class Member 12	\$ 21,752
Class Member 13	\$ 20,658
Class Member 14	\$ 19,784
Class Member 15	\$ 19,594
Class Member 16	\$ 19,032
Class Member 17	\$ 18,149
Class Member 18	\$ 17,814
Class Member 19	\$ 17,443
Class Member 20	\$ 15,606
Class Member 21	\$ 15,152
Class Member 22	\$ 14,229
Class Member 23	\$ 12,908
Class Member 24	\$ 12,674
Class Member 25	\$ 12,355
Class Member 26	\$ 11,455
Class Member 27	\$ 11,340
Class Member 28	\$ 10,894
Class Member 29	\$ 10,620
Class Member 30	\$ 10,338
Class Member 31	\$ 10,262
Class Member 32	\$ 9,860
Class Member 33	\$ 9,835
Class Member 34	\$ 9,777
Class Member 35	\$ 9,726
Class Member 36	\$ 9,477
Class Member 37	\$ 9,377
Class Member 38	\$ 9,001
Class Member 39	\$ 8,813
Class Member 40	\$ 8,746

Data Source(s): FXDD, GAIN, Olsen Daily Mean Spread, Zip Code, and U.S. Federal Reserve Exchange Rate Data (see Exhibit 6)

Source File(s): FXDD and GAIN combined.do; FXDD and GAIN combined.xlsx

**Allocation for 40 Randomly Selected Claimants in FXDD and GAIN Data**

<b>Alias</b>	<b>Settlement Amount</b>
Class Member 41	\$ 12
Class Member 42	\$ 35
Class Member 43	\$ 36
Class Member 44	\$ 178
Class Member 45	\$ 49
Class Member 46	\$ 31
Class Member 47	\$ 41
Class Member 48	\$ 49
Class Member 49	\$ 31
Class Member 50	\$ 27
Class Member 51	\$ 30
Class Member 52	\$ 31
Class Member 53	\$ 200
Class Member 54	\$ 10
Class Member 55	\$ 40
Class Member 56	\$ 33
Class Member 57	\$ 30
Class Member 58	\$ 40
Class Member 59	\$ 114
Class Member 60	\$ 53
Class Member 61	\$ 58
Class Member 62	\$ 38
Class Member 63	\$ 145
Class Member 64	\$ 26
Class Member 65	\$ 29
Class Member 66	\$ 111
Class Member 67	\$ 701
Class Member 68	\$ 262
Class Member 69	\$ 28
Class Member 70	\$ 18
Class Member 71	\$ 3,344
Class Member 72	\$ 30,434
Class Member 73	\$ 11
Class Member 74	\$ 26
Class Member 75	\$ 27
Class Member 76	\$ 34
Class Member 77	\$ 66
Class Member 78	\$ 25
Class Member 79	\$ 35
Class Member 80	\$ 32

Data Source(s): FXDD, GAIN, Olsen Daily Mean Spread, Zip Code, and U.S. Federal Reserve Exchange Rate Data (see Exhibit 6)

Source File(s): FXDD and GAIN combined.do; FXDD and GAIN combined.xlsx

**Average Spreads by Currency Pair**

December 1, 2007\* through December 31, 2015\*\*

<b>Currency Pair</b>	<b>Spread</b>	<b>Currency Pair</b>	<b>Spread</b>
AUD/CAD	0.0760%	GBP/NZD	0.0644%
AUD/CHF	0.0786%	GBP/SEK	0.1122%
AUD/JPY	0.0345%	GBP/USD	0.0172%
AUD/NZD	0.0625%	HKD/JPY	0.0862%
AUD/USD	0.0266%	JPY/NOK	0.1247%
CAD/CHF	0.0686%	JPY/SEK	3.8059%
CAD/JPY	0.0404%	NZD/CAD	0.1050%
CHF/JPY	0.0439%	NZD/CHF	0.1199%
CHF/NOK	0.0804%	NZD/JPY	0.0755%
CHF/SEK	0.0903%	NZD/USD	0.0465%
EUR/AUD	0.0356%	SGD/JPY	0.0797%
EUR/CAD	0.0398%	TRY/JPY	0.1735%
EUR/CHF	0.0236%	USD/CAD	0.0265%
EUR/CZK	0.1528%	USD/CHF	0.0286%
EUR/DKK	0.0140%	USD/CNH	0.0456%
EUR/GBP	0.0243%	USD/CNY	0.0521%
EUR/HUF	0.1709%	USD/CZK	0.2350%
EUR/JPY	0.0208%	USD/DKK	0.0263%
EUR/NOK	0.0727%	USD/HKD	0.0091%
EUR/NZD	0.0702%	USD/HUF	0.2887%
EUR/PLN	0.1213%	USD/ILS	0.2225%
EUR/SEK	0.0618%	USD/INR	0.0837%
EUR/TRY	0.1902%	USD/JPY	0.0189%
EUR/USD	0.0135%	USD/MXN	0.0720%
GBP/AUD	0.0324%	USD/NOK	0.0819%
GBP/CAD	0.0355%		
GBP/CHF	0.0351%		
GBP/JPY	0.0281%		

## Notes(s):

\*USD/CNH starts on April 18, 2011.

\*\*USD/CNY, USD/INR, and USD/TWD end on December 31, 2014.

To calculate the average spread percentages, I first divide Olsen's daily average spreads by the daily buying exchange rates collected by the U.S. Federal Reserve, Czech National Bank, Hungarian National Bank, National Bank of Poland, Bank of Russia, and Central Bank of the Republic of Turkey. For USD/CNH, I use Olsen's daily average median bid as the denominator. I then take the average of these percentages across the relevant time period.

## Data Source(s):

Olsen Daily Mean Spread, Olsen Daily Median Bid, U.S. Federal Reserve Exchange Rate, and Other Exchange Rate Data (see Exhibit 6)

## Source File(s):

Olsen\_currency\_avg\_spread\_ratios.do; Olsen\_currency\_avg\_spread\_ratios.xlsx

## Data Source Files

### FXDD Data

FXDD Customer Information

FXDD Customer Transactions

### GAIN Data

GAIN Customer Information

GAIN Customer Transactions

### Olsen Daily Mean Spread Data

fx-spot_AUD_CAD_DailyMeanSpread_200712_201512.csv	fx-spot_EUR_PLN_DailyMeanSpread_200712_201512.csv	fx-spot_USD_CNY_DailyMeanSpread_200712_201412.csv
fx-spot_AUD_CHF_DailyMeanSpread_200712_201512.csv	fx-spot_EUR_SEK_DailyMeanSpread_200712_201512.csv	fx-spot_USD_CSK_DailyMeanSpread_200712_201512.csv
fx-spot_AUD_JPY_DailyMeanSpread_200712_201512.csv	fx-spot_EUR_TRY_DailyMeanSpread_200712_201512.csv	fx-spot_USD_DKK_DailyMeanSpread_200712_201512.csv
fx-spot_AUD_NZD_DailyMeanSpread_200712_201512.csv	fx-spot_EUR_USD_DailyMeanSpread_200712_201512.csv	fx-spot_USD_HKD_DailyMeanSpread_200712_201512.csv
fx-spot_AUD_USD_DailyMeanSpread_200712_201512.csv	fx-spot_GBP_AUD_DailyMeanSpread_200712_201512.csv	fx-spot_USD_HUF_DailyMeanSpread_200712_201512.csv
fx-spot_CAD_CHF_DailyMeanSpread_200712_201512.csv	fx-spot_GBP_CAD_DailyMeanSpread_200712_201512.csv	fx-spot_USD_INR_DailyMeanSpread_200712_201412.csv
fx-spot_CAD_JPY_DailyMeanSpread_200712_201512.csv	fx-spot_GBP_CHF_DailyMeanSpread_200712_201512.csv	fx-spot_USD_JPY_DailyMeanSpread_200712_201512.csv
fx-spot_CHF_JPY_DailyMeanSpread_200712_201512.csv	fx-spot_GBP_JPY_DailyMeanSpread_200712_201512.csv	fx-spot_USD_MXP_DailyMeanSpread_200712_201512.csv
fx-spot_EUR_AUD_DailyMeanSpread_200712_201512.csv	fx-spot_GBP_NZD_DailyMeanSpread_200712_201512.csv	fx-spot_USD_NOK_DailyMeanSpread_200712_201512.csv
fx-spot_EUR_CAD_DailyMeanSpread_200712_201512.csv	fx-spot_GBP_USD_DailyMeanSpread_200712_201512.csv	fx-spot_USD_PLN_DailyMeanSpread_200712_201512.csv
fx-spot_EUR_CHF_DailyMeanSpread_200712_201512.csv	fx-spot_NZD_CAD_DailyMeanSpread_200712_201512.csv	fx-spot_USD_RUB_DailyMeanSpread_200712_201512.csv
fx-spot_EUR_CSK_DailyMeanSpread_200712_201512.csv	fx-spot_NZD_CHF_DailyMeanSpread_200712_201512.csv	fx-spot_USD_SEK_DailyMeanSpread_200712_201512.csv
fx-spot_EUR_DKK_DailyMeanSpread_200712_201512.csv	fx-spot_NZD_JPY_DailyMeanSpread_200712_201512.csv	fx-spot_USD_SGD_DailyMeanSpread_200712_201512.csv
fx-spot_EUR_GBP_DailyMeanSpread_200712_201512.csv	fx-spot_NZD_USD_DailyMeanSpread_200712_201512.csv	fx-spot_USD_TRY_DailyMeanSpread_200712_201512.csv
fx-spot_EUR_HUF_DailyMeanSpread_200712_201512.csv	fx-spot_SGD_JPY_DailyMeanSpread_200712_201512.csv	fx-spot_USD_TWD_DailyMeanSpread_200712_201412.csv
fx-spot_EUR_JPY_DailyMeanSpread_200712_201512.csv	fx-spot_USD_CAD_DailyMeanSpread_200712_201512.csv	fx-spot_USD_ZAR_DailyMeanSpread_200712_201512.csv
fx-spot_EUR_NOK_DailyMeanSpread_200712_201512.csv	fx-spot_USD_CHF_DailyMeanSpread_200712_201512.csv	fx-spot_ZAR_JPY_DailyMeanSpread_200712_201512.csv
fx-spot_EUR_NZD_DailyMeanSpread_200712_201512.csv	fx-spot_USD_CNH_DailyMeanSpread_201104_201512.csv	

### Olsen Daily Median Bid Data

fx-spot\_USD\_CNH\_DailyMedianBid\_201104\_201512.csv

### Zip Code Data

U.S. Census Bureau, 11 March 2013, 2010 Zip Code Tabulation Area to County Relationship, [http://www2.census.gov/geo/docs/maps-data/data/rel/zcta\\_county\\_rel\\_10.txt](http://www2.census.gov/geo/docs/maps-data/data/rel/zcta_county_rel_10.txt), accessed 05 December 2019.

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### U.S. Federal Reserve Exchange Rate Data

Board of Governors of the Federal Reserve System (US), Undated, FRED Add-In for Microsoft Excel, <https://fred.stlouisfed.org/fred-addin/>, accessed 24 April 2019.

Series:	AEXBZUS	AEXNUS	AEXUSNZ	DEXKOUS	DEXTHUS	EXCHUS	EXKOUS	EXSPUS
	AEXCAUS	AEXSDUS	AEXUSUK	DEXMAUS	DEXUSAL	EXDNUS	EXMAUS	EXSZUS
	AEXCHUS	AEXSFUS	AEXVZUS	DEXXMUS	DEXUSEU	EXFNUS	EXMXUS	EXTAUS
	AEXDNUS	AEXSIUS	DEXBZUS	DEXNUS	DEXUSNZ	EXFRUS	EXNEUS	EXTHUS
	AEXHKUS	AEXSLUS	DEXCAUS	DEXSDUS	DEXUSUK	EXGEUS	EXNUS	EXUSAL
	AEXINUS	AEXSZUS	DEXCHUS	DEXSFUS	DEXVZUS	EXGRUS	EXPOUS	EXUSEU
	AEXJPUS	AEXTAUS	EXDNUS	DEXSIUS	EXAUUS	EXHKUS	EXSDUS	EXUSIR
	AEXKOUS	AEXTHUS	DEXHKUS	DEXSLUS	EXBEUS	EXINUS	EXSFUS	EXUSNZ
	AEXMAUS	AEXUSAL	DEXINUS	DEXSZUS	EXBZUS	EXITUS	EXSIUS	EXUSUK
	AEXMXUS	AEXUSEU	DEXJPUS	DEXTAUS	EXCAUS	EXJPUS	EXSLUS	EXVZUS

### Other Exchange Rate Data

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Czech National Bank, Undated, Exchange rates - yearly history: 2000 (CZK), <https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2000>, accessed 09 July 2019.

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Czech National Bank, Undated, Exchange rates - yearly history: 2002 (CZK), <https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2002>, accessed 09 July 2019.

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Czech National Bank, Undated, Exchange rates - yearly history: 2004 (CZK), <https://www.cnb.cz/en/financial-markets/foreign-exchange-market/central-bank-exchange-rate-fixing/central-bank-exchange-rate-fixing/year.txt?year=2004>, accessed 09 July 2019.

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## Settlement Funds

Fund	Settlement Class Period		Fund Amount
	Start Date	End Date	
Citigroup and MUFG Bank	1-Dec-07	29-Jul-19	\$10,935,000
SocGen and Standard Chartered	1-Dec-07	Preliminary approval*	\$2,695,000
Group Settling Defendants	1-Dec-07	15-Dec-15	\$10,000,000
Total (Gross)			\$23,630,000
Fees (30%)			(\$7,089,000)
Total (Net)			\$16,541,000

Note(s):           \*The end date will be the the date of the Court's order granting preliminary approval of the SocGen and Standard Chartered Settlement.

Data Source(s):   Counsel